Site Name: East Waterway Operable Unit

Document: Technical Memorandum, Anthropogenic Background Evaluation, Prepared by Anchor QEA, March 2021

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Comment Date: 4/7/2021

Comment Number	Section	Page Number and Paragraph	Review Comment	Response
1	General		**Issue: Anthropogenic background media is not consistent with the SMS.** Sediment cleanup levels for the site must be consistent with the SMS. The legal definition of sediment and surface sediment in the SMS rule WAC 173-204-505(22) is: *settled particulate matter located at or below the ordinary high water mark, where the water is present for a minimum of six consecutive weeks, to which biota (including benthic infauna) or humans may potentially be exposed, including that exposed by human activity (e.g., dredging).* In other words, bedded sediment. The data used to calculate AB values excluded all bedded sediment and relied solely on suspended solids collected through centrifugation. A sediment cleanup level (or RAO/PRG) must comply with the legal and substantive provisions in the SMS rule regardless of the basis of the cleanup level (i.e., risk or background). According to the SMS rule, bedded sediment is consistent with the state's legal definition but suspended solids are not. **Recommendation:** Base anthropogenic background on bedded sediment. Ecology's preferred recommendation is to collect bedded sediment samples specifically to calculate anthropogenic background and ensure the sampling stations are consistent with the SMS regional background provision (i.e., away from the direct influence of point sources and identifiable sources). Due to EPA's compressed schedule which appears non-negotiable, this may not be a favorable option for EPA. A second, but less preferred, recommendation is to include previously collected bedded sediment samples, which could be combined with <u>all</u> suspended solids data since this represents a part of the load flowing downstream.	The SMS regional background inputs and calculations include many discretionary elements, including methods to calculate background, statistical analyses, and sampling determinations. Because of the discretionary nature of these elements, EPA utilized its own guidance, methodologies, and approach for calculating background to meet the substantive requirements of WAC 173-204-709 and WAC 173-204-560. The discretionary aspects of the methodologies and calculations in the state regulatory provisions would not be considered ARARs. Background values developed for use in East Waterway OU were developed based on data and assumptions that are specific to the East Waterway.. Data representing sediment that has already been deposited in the Green River at the sample locations from the various studies used are dissimilar to sediments that are transported further downriver and ultimately settle in the EW. As such, they are not appropriate for deriving background.

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2	General		**Issue: Anthropogenic background media appears to be inconsistent with EPA guidance.** Both EPA's 2018 Frequently Asked Questions About the Development and Use of Background Concentrations at Superfund Sites: Part One, General Concepts guidance and EPA's 1992 Soil Background guidance state: *For sites being evaluated under the HRS for possible placement on the NPL, "[b]ackground and release samples must be from the same medium (e.g., soil, water, tissue) and should be as similar as possible. Similar sampling methods should be used to obtain background and release samples (US EPA, 1992b).*" Since "release samples" is assumed to mean site sediment, the use of suspended solids to establish anthropogenic background is inconsistent with EPA guidance. **Recommendation:** Base anthropogenic background for the sediment site on bedded sediment.	The cited EPA document (EPA "FAQs about the Development and Use of Background Concentrations at Superfund Sites" continues on from the commenters excerpt to state the following: "In dynamic environments, such as rivers and estuaries, sediment and water can transport in to and out of the site. Under those circumstances, it is important to determine whether background contaminants migrate into the site and, if so, to adequately sample areas which are contributing those contaminants. In this regard, the memo, "Remediating Contaminated Sediment Sites," states "[a]t large contaminated sediment sites, it may be important to evaluate background concentrations and the potential for recontamination" (US EPA, 2017). EPA (1995a) emphasizes that background sites "should be upstream, upgradient, or upwind of the site." EPA considers the Green River upstream site to be an appropriate location and that the suspended sediment adequately represents that portion of the upstream sediment that is likely to migrate into the site.
3	General		**Anthropogenic background media is inconsistent with natural background.** Puget Sound sediment natural background was established through a collaborative effort between Ecology, EPA, DNR, and the Army Corps of Engineers (SCUM, Chapter 10). Both EPA and Ecology have agreed to use this dataset at our respective MTCA and CERCLA sites in Puget Sound, with the exception of how the final values are established (e.g., identification of outliers, statistical metrics). This natural background data set media is bedded sediment which is inconsistent with the EPA's decision to exclusively use suspended solids to establish anthropogenic background for the sediment site. Recommendation: Base anthropogenic background for the sediment site on bedded sediment.	Based on the CSM, EPA does not consider the bedded sediment in the Green River to be representative of sediment that is likely to migrate to the EW OU and thus be considered appropriate for evaluation of Anthropogenic Background. The bedded sediments at sites adjacent to or near the EW OU are influenced by either the LDW superfund site or other contaminant sources that are inconsistent with those influencing the EW OU. The suspended sediment data from the Green River was considered to be the best available data set to estimate AB for the EW OU.

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4	General		**Issue: Questionable assumptions of recontamination potential.** Based on EPA's guidance anthropogenic background and recontamination values could be the same under certain circumstances, and it appears there was a predetermined assumption that anthropogenic background and recontamination values were the same for the site. However, this assumption does not appear to be supported or validated by robust data, reasoning, or documentation. **Recommendation:** Clearly detail what work was done to reliably predict and validate the assumption that the resulting anthropogenic values are the actual recontamination values. To validate this assumption, further sampling may be necessary. Considering the site receives 4.2 cm/year of depositional material and the site-wide average deposition rate is 1.2 cm/year—after contamination from lateral loads is controlled and cleanup is conducted—analyzing the top 2 cm of site sediment focused on where the majority of deposition occurs would reasonably represent recent deposition and analyzing suspended solids where they enter the site may reliably validate this assumption. However, since this would be done after the ROD is finalized and cleanup levels established, it seems premature to establish cleanup levels at anthropogenic background based on assumptions of recontamination at that level.	Based on the CSM and modeling incorporated in the FS, the primary source of sediments and associated contaminants is Green River suspended sediments. The approach used for establishing AB was based on this CSM. . EPA considers "recontamination potential" for the EW OU to be represented by direct lateral inputs to the waterway, and from contaminated sediment left in place. These potential sources of recontamination were specifically excluded from the determination of anthropogenic background.
5	General		**Issue: Data was biased high by inappropriate data screening.** There was a detailed data screening process (e.g., samples were limited to two locations, excluding bedded sediment, and removing larger grain size suspended solids data) which resulted in a narrow dataset to calculate final values. This data screening appeared to be focused on screening out data with lower concentrations which inappropriately biased the resulting values high. **Recommendation.** To establish anthropogenic background use bedded sediment media and appropriate statistical outlier analysis to screen data. At the very least, include all bedded sediment and suspended solids data with appropriate statistical outlier analysis to screen data.	The screening process is described in the AB memo. The AB screening process was based on which data sets were appropriate to include rather than how they would affect the AB concentration. As indicated in the AB memo, the inclusion/exclusion of data was based on the CSM for the EW OU. Bedded sediment data from the Green River were considered not to be appropriate as they represent material that has deposited and does not continue downriver. Outliers analysis was conducted as part of the data screening as described in Section 4.5.
6			**EPA's definition of anthropogenic background is inconsistent with the SMS.** According to EPA's guidance, anthropogenic background represents concentrations unrelated to the site.	See response to Question 1. The sampling location at RM 10.4 represents an area that drains approximately 300,000 acres. It is impractical to identify "all sources and releases" within this drainage basin, or the relative effect on

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			And, the guidance does not appear to exclude point sources (e.g., upstream contaminated sites or identifiable releases) from anthropogenic background. If EPA's anthropogenic background will be used as a cleanup level, then it must comply with the SMS, specifically the definition of regional background WAC 173-204-505(16): *the concentration of a contaminant within a department-defined geographic area that is **primarily attributable to diffuse sources**, such as atmospheric deposition or stormwater, **not attributable to a specific source or release***. EPA's past responses to this issue that "…EPA is not trying to establish regional background for the site" does not resolve this issue. **Recommendation:** Clearly show how the sampling locations comply with this provision by identifying all sources and releases (point and nonpoint) that may impact these locations, how the concentrations in the data set are not primarily impacted by point sources and identifiable releases, and how this data set was determined to be primarily impacted by diffuse sources (i.e., nonpoint sources).	each at the point of measurement at the Foster Links Golf course at RM 10.4. Further, neither the Green River watershed nor Elliott Bay/Puget Sound are closed systems. As such, the degree to which chemical concentrations in any specific area are not "attributable to a specific source or release" is open to a range of professional judgement.
7	General		There's several percentages given throughout the sections. Please add the amounts of what the percentages represent.	The percentages appear to be appropriately described.
8	ES	ES-1/3rd Bullet	It should be noted that the dioxins/furans sediment cleanup level under SMS is established based on TEQ, not individual congeners.	A TEQ calculation is included.
9	1.2	2/1	As commented above, it appears that the CERCLA program normally does not set cleanup levels below anthropogenic concentrations due to consideration of cost effectiveness, technical practicability, and the potential of recontamination from adjacent areas with elevated background concentrations. However, the cleanup levels established under SMS only considers technical possibility and net adverse environmental impact, not cost.	This memo establishes AB for use in a CERCLA site. An explanation of differences with SMS is not appropriate for this memo. See response to Question 1.
10	1.2	2/3	The term "point source" means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural stormwater	The general description of anthropogenic sources not considered to be directly associated with the EW OU are presented appropriately for this CERCLA project.

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			discharges and return flows from irrigated agriculture. Clean Water act section 502. Please explain the use of point source in a CERCLA context verses the Clean Water Act context.	
11	1.3	2/1	Please remove our name from the sentence. Keep the foot about Ecology's attendance of informational meetings.	Agreed. Reference to Ecology will be removed from the text. The footnote will be retained.
12	2.1	4/1	The reference to watershed should be Fig 2-4, not Fig 2-3.	Agreed. Figure numbers will be corrected.
13	2.1	5/1	It's Fig 2-7, not 2-6 that presents the average daily flows information.	Agreed. Figure numbers will be corrected.
14	2.1	5/2	It's Fig 2-8, not 2-7 that presents the precipitation data.	Agreed. Figure numbers will be corrected.
15	2.2	5/1	The EW and LDW lateral drainage basins are shown in Fig 2-6, not Fig 2-8.	Agreed. Figure numbers will be corrected.
16	2.2	6/1	Typo, "though" should be "through"	Will be corrected.
17	2.3	7/1	Though sediment mass input from LDW resuspended bedded sediments to East Waterway is relatively small, the percentage contribution of chemical loading from it might increase following completion of active remedial actions and implementation of further source control measurements at LDW. Additional information should be provided to support why LDW bed loading is not included in the AB evaluation.	The contributions from the LDW are not included in AB because it is a Superfund site and its contribution is minimal.
18	3	8, 4	CERCLA releases were considered but not MTCA releases. There are 5 MTCA sites waiting to be cleaned up and 11 MTCA sites that have begun but not completed cleanup on or near the Green River between river mile 10.4 and the turning basin. These sites could have been reviewed to determine if they are potential sources of PCBs, dioxins/furans, or arsenic to the river.	Data were not provided for the group to review. The group reviewed data available for review. It is unclear why Ecology has not determined whether specific sites under its oversight represent potential sources of contamination to the river. However, since these sites represent known potential source, they would not be included in the calculation of anthropogenic background.
19	3.2	13/1	The lateral input from RM 5.0-10.4 can't be simply eliminated, additional information should be provided.	The data collected at RM 10.4 represented the most comprehensive dataset. And as noted by Ecology in the previous comment, there are known potential sources located downstream of RM 10.4, making data collected in this area less suitable for determining background.
20	3.2	13/1	Add a discussion about how the upstream, above river mile 10.4, urbanized environmental contaminates contributions.	The AB memo describes the upstream areas and the development in those areas.
21	3.2	13/3	The sentence is accurate as a statement however sufficiently controlled to proceed with cleanup has nothing to do with the subject matter. Ecology's sufficiency criteria is intended to meet various RAL's. Anthropogenic background deals with achieving cleanup levels which are different from the RAL's.	Will ask that the first sentence of the last paragraph in this section be deleted, as the degree to which source-control actions are in place at the LDW site aren't relevant to the calculation of anthropogenic background

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22	3.2	13/3	At least for the LDW, the lateral inputs (point sources) are considered part of the CERCLA release, due to the language EPA used when listing the site. Which essentially states the site is defined as beginning at the South end of harbor island, extending upstream and all sources entering the site.	The lateral loads include both point and nonpoint sources (such as non-point stormwater runoff). However, there is insufficient data to adequately separate the point and non-point sources in the lateral loads and they were not included in the AB dataset.
23	4.2.2	16/Table 4-3	UCL95 should also be calculated and compared using each of the four non-detect treatments and included in the table since AB is established using UCL95.	Different summing methods were evaluated as to whether they had any notable effect on calculated sums. These modifications did not result in a substantial change in the AB value; however, the potential impact is discussed in the uncertainties section.
24	4.2.2	16/3	It states that applying 0 as the non-detect treatment for the dataset is to remain consistent with the EW SRI and FS. This statement is not appropriate since the goal of conducting RI and FS is different. Other justification needs to be provided.	The AB memo discusses the different summing methods including 0, ½ DL, and full DL. These modifications did not result in a substantial change in the AB value; however, the potential impact is discussed in the uncertainties section.
25	4.4	18/2	If the partitioning behavior and mobility of arsenic is significantly influenced by biogeochemical conditions, then it is not appropriate to simply use the suspended solids data collected more than 10 miles upstream to calculate the EW anthropogenic background.	The extent to which biogeochemical processes affect deposited arsenic in the EW OU following remediation is not known. Setting a cleanup level based on the Green River suspended sediment data is consistent with the approach used for PCBs and D/F. Post-remedial monitoring will provide arsenic concentrations.
26	4.6	21/1	Please provide the range of %fines in the EW bedded sediment.	Grain size ranges for the EW will be added to the CSM section.
27	4.6.2	22/1	The equation assumes that all contaminant mass is in the fine grained fraction of suspended solids. This assumption overestimates the %fines that entering and settling down within EW from upper stream, and might result in higher anthropogenic background concentrations.	The potential impacts of fines normalization to the data have been discussed in the last paragraph of this section, including this statement. The AB memo evaluated the inclusion of data with no adjustments for grain size, the exclusion of low-fines data, fine-grain size normalization, and a surface-area adjusted data analysis. As indicated in the AB memo, the workgroup determined that no normalization for grain size would overestimate the coarse material entering the EW OU. Simply excluding low fines data would underestimate the contribution of coarse material. Fines normalization provided some adjustment to account for the coarse material that does not enter the EW.
28	4.6.3	22/3	The second sentence is grammatically incorrect.	This section will be edited by the EWG for grammar.
29	5.1	25/2	Please explain why using the “mean concentrations”, not the 95 UCL in the sensitivity analysis.	For the purposes of an uncertainty analysis, a comparison of mean values is sufficient to evaluate the effect of the different data treatments.

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30	5.1	25/ 3	In the third sentence, “in” should be replaced by “an” as follows: …positive percentages indicate **an** increase in…	Change will be made.